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STATE OF MONTANA

BULLETIN

OF THE

Department of Public Health

Vol. 6 Febuary 15, 1914 No. 11

MONTANA STATE BOARD OF HEALTH

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Consulting Sanitary Engineer.

HELENA, MONTANA.

Published Monthly at Helena, by the State Board of Health.

"The science of disease prevention, if properly applied, can add fifteen years to the present average length of human life."—Prof. Irving Fisher, Yale.

This Bulletin will be mailed monthly to any person in Montana upon request mailed to the Secretary of the State Board of Health at Helena.

ALLIED PRINTING TRADES UNION LABEL COUNCIL HELENA 1

HEALTH OFFICERS' MEETING.

A very enthusiastic meeting of Health Officers was held in Billings, January 29th, at which meeting the Eastern Montana Health Officers' Association was duly organized. Nearly all of the Eastern Counties were represented at this meeting. Dr. W. J. Butler, State Veterinarian; A. G. Scholes, State Dairy Commissioner; Mr. C. W. Tenney, Rural Sanitary School Inspector, and Miss Hughes, Secretary of the Nurses' Examining Board, were present and took part in the meeting.

Mayor Nevins of Billings welcomed the Health Officers on behalf of the City. Dr. E. G. Balsam was elected temporary chairman and under his direction the following program was carried out:

MORNING SESSION.

9:00 A. M.

1. A system for the disposal of garbage in small towns.. ....Dr. S. M. Souders, Red Lodge
   Discussion by Dr. E. G. Balsam, Billings, and Dr. B. Consler, Glendive.
2. Rural Sanitation.........Prof. W. M. Cobleight, Bozeman
   Discussion by Dr. C. T. Pigot, Roundup, and Dr. Gaylord McCoy, Joliet
3. Some points to be observed in preventing the spread of Scarlet Fever.............Dr. M. H. Arnold, Billings
4. An effective dairy inspection for the State of Montana ....A. G. Scholes, Helena
   Discussed by Dr. W. J. Butler, State Veterinarian.

AFTERNOON.

2:00 P. M.

1. A system of medical inspection of schools............ ....Dr. S. E. Leard, Livingston
   Discussion by Prof. Nye, Billings, and Dr. T. B. Marquis, Clyde Park.
2. School nursing.........................Miss Hughes, Helena
   Discussion by Dr. A. W. Deal, Lewistown, and Dr. D. Claiborn, Big Timber.
3. Some reforms needed in the State Health Service....... ....Dr. J. C. Denney, Clyde Park
4. Subject to be announced.........Dr. J. Piedalue, Bozeman

EVENING.
8:00 P. M.
Question Box and Free for All.

At the completion of the program a permanent organization was effected with the following officers: Dr. Mott Arnold, President, and Dr. W. F. Cogswell, Secretary.

In the evening the Association was entertained by the Yellowstone County Medical Society at a banquet at the Northern Hotel.

SCARLET FEVER FROM A HEALTH STANDPOINT.

(By Dr. T. E. Murray, Local Health Officer, Great Falls.)

Scarlet fever was first classified as a distinct disease among the acute exanthemata by Sydenham in 1670, and by Withering in 1793. Haiser asserts that the epidemics described by Galen correspond to the scarlet fever of the present day. Scarlet fever has been present in Europe, Asia and Africa since first described by Sydenham. The first outbreak of scarlet fever in North America was in Massachusetts in 1735 and rapidly spread as civilization advanced westward. It was first noticed in South America in 1830.

Scarlet fever is an acute specific contagious and infectious disease, having an incubation period of from a few hours to several days, varying with the different epidemics. The cause of scarlet fever is unknown but the streptococci were thought to be the specific cause, as was advocated by Klein in 1885. It is now thought that the strepococcus plays a secondary role in scarlet fever as it does in small-pox. And that the disease is due to a protozoan-like body, found between the epithelial cells, which lowers the resisting powers and a secondary streptococcal invasion takes place. The true nature of the scarlet fever is unknown but is found in the tonsil, tongue. lymph nodes, blood and the pericardial fluid. The poison seems to be less volatile than that of measles and small-pox.

Climatic conditions plays an important role in scarlet fever. It is rare in the Tropics and when introduced it soon disappears. Japan enjoys freedom from scarlet fever and a very small amount is found in India. There is very little scarlet fever in the Southern States and Southern California as compared to the Northern States. In this country, epidemics are more common in the Fall and Winter months and has a tendency to assume a more virulent form. In England scarlet fever increases from May to October.

The contagion depends on a direct or indirect exposure to the specific poison. On direct exposure, the contact must be an intimate one. It may be from the secretions of the pharynx, from a discharging ear or by means of the epidermic scales, and for this reason it is possible to protect others by a proper isolation of the infected individual.

On indirect exposure the disease may be contracted by contact with a third person that has been exposed, as cited by a case by Allbutt.

The case cited by Boeck; in which two children were infected by handling a lock of hair that had been taken from a child that had died twenty years prior to that time with scarlet fever. Also cases cited by Thomas, where the contagion was transferred by a letter, a box of toys, a violin and even by a piano. Dogs and cats are thought to carry the infection, and in a case under my observation, a kitten carried the infection to a baby, which proved fatal. At one time the distempers of animals with exfoliation of the epidermis was thought to simulate scarlet fever, but this theory has been rejected.

The milk supply may be a frequent vehicle for infection. Trask collected 51 scarlet fever epidemics spread by milk supply. Twenty-five of these were in the United States and 26 in Great Britain. In 35 a case of scarlet fever was found at the general distributing point. In three, the bottles were returned from infected houses and were not sterilized, in 12 the cows were milked by persons having scarlet fever, and in two cases it was supposed to be due to diseases of the cow. In Japan, where cows milk is not used as a staple diet, there is no scarlet fever, but this may be due to a climatic condition. The same condition exists in India, where the mothers nurse the children up to five or seven years of age.

Different authorities agree that scarlet fever is not contagious during the period of incubation, little if any during the period of invasion, and most contagious during the period of eruption. The theory that the period of desquamation is the most infectious is gradually losing ground with the profession, providing that there is no mucus involvments. We have no set rules for determining how long an individual remains infective after an attack of scarlet fever, and different states have different periods of quarantine. We have adhered to a minimum quarantine period of 28 days, and longer in cases of rhinorrhea, ottorhea discharging abscesses and desquamation. The children are not permitted to return to school for a period of two weeks after being released from quarantine, and are then required to present a medical certificate stating that they are not infective.

During epidemics of scarlet fever there is a general clamor to have schools closed. In rural schools, it seems best to do so, as the children are kept apart and any existing infection can then be confined to the infected family. In a crowded city or town where the sanitary conditions are poor it is conceded by authorities that the children are safer in a well ventilated school room, which can be thoroughly fumigated, than to be playing together in filthy streets and alleys, and where they are exposed from proximity to places under quarantine.

Teachers should be instructed in regard to the diagnosis of scarlet fever, of both early and latent cases, and should notify the health officer of any suspicious cases. Children that are sick should be sent home and any children absent for a period of two or three days should be reported to the health department for investigation. The health department should notify the teacher of any existing cases of scarlet fever in her district, giving the home address and age of the child. The children attending school should be warned to keep away from the places under quarantine. All members of the family infected should be excluded from the school room until they present a medical certificate of non-infection.

If a case of scarlet fever is discovered in a school room; the school room is declared infected and a thorough fumigation is established. In a recent epidemic of scarlet fever in a portion of the city of Great Falls, a few cases of walking scarlet fever were discovered and other suspected cases were brought to the notice of the Board of Health by the principal of the school in that district.

I am heartily in favor of having medical examinations of school children at definite intervals. By such examinations mild cases that have no medical care can be excluded and a definite history of any suspicious sickness can be obtained and investigated. Cases under quarantine are not feared, but the cases that have not been discovered are the source of infection. The librarian should be kept in touch with all cases so that books will not be returned for distribution without their knowledge of the conditions.

The prophylaxis of scarlet fever is of the utmost importance and this should begin with the education of the public with instructions in regard to the care of the children. The specific prophylaxis as first proposed by Gabritschewsky, has as its object the conferring of immunity against scarlet fever by the use of streptococcus vaccines. He uses 0.5CC of the concentrated bouillon culture in children from two to ten years, and for those younger one-half the dose. Three injections are given in a period of from seven to ten days. The dose increases at each injection one and one-half to two times the previous dose The patient has a sore throat and a slight rash may appear. He claims after two or three injections a complete immunity is established against scarlet fever. The immunity probably lasts one and one-half years. Richard M. Smith reports 50,000 cases in which the culture was used with a fatality of one.

Streptococcus vaccines as a prophylaxis has been used extensively in Russia with gratifying results. The report of Smirnoff of 485 cases vaccinated by him with the following results:

1 Injection, 285 cases—5 cases scarlet fever.
2 " 148 " 3 " " "
3 " 22 " 0 " " "

The vaccines may fill a long wanted need in the prevention of scarlet fever. Moser's polyvolent anti-streptococcus serum has been used in treatment and Hare recommends the use of diptheritic antitoxin in the treatment of scarlet fever. A mixed infection of scalet fever and diphtheria is common and culture should be taken of suspected cases as there is a tendency to the formation of a diphtheritic of pseudo-diphtheritic exudate in scarlet fever. The strictest attention should be paid to isolation and disinfection. The patient should be isolated in the home or better still in a contagious hospital. Every city or town should have a modern contagious hospital with wards for the different contagious diseases. It should have a small operating room for the necessary surgical operations. The hospital should be situated in a convenient and sanitary location and should be under the supervision of competent and trained nurses and should have a suitable ambulance service for conveying the patients.

Sporadic cases could be placed in the hospital for treatment and the house thoroughly fumigated and the exposed members of the family placed under close observation. By doing this we eliminate a foci of infection. It seems unjust to quarantine a family with the infected child and await for the entire family to come down with the dread disease with probably a loss of one or more lives which could be saved by the removal of the patient to the hospital. Scarlet fever is a dangerous disease and no makeshift hospital service should be permitted.

A rigid quarantine can be established in a home if you can depend on the co-operation of the family. There should be plenty of room to segregate the children. The patient should be isolated in a room that is properly ventilated and all unnecessary drapery and furniture should be removed. Sheets should be nailed across the entrance door and should be sprayed with a solution of one to twenty carbolic acid. The woodwork and furniture should be frequently washed with a bichloride solution of one to one thousand.

All discharges from the body should be destroyed and the attending nurse should not be permitted to leave the room without a change of clothing. The medical attendant should protect his clothing with a gown and wear a suitable covering over the hair and face. He should wear overshoes and rubber gloves. All instruments should be left in the sick room and should not be used again until thoroughly sterilized. Before the patient is released from quarantine he should be free from any mucus involvement, discharging abscesses and desquamations. The room should be sealed up and thoroughly fumigated together with all the clothes of the patient. We have used the De Pue method and the formalin potassium system. After fumigation the house should be thoroughly aired and the woodwork and furniture washed with a mercury solution. All the toys and books used in the room and all other articles that cannot be thoroughly fumigated should be destroyed. The patient should receive a bichloride bath and shampoo and then changed to clean and disinfected clothing.

In every epidemic the milk supply should be investigated if infection seems probable from that source. Orders should be given in regard to receiving bottles from infected places. Garbage should be burned or disinfected and no accumulation of garbage or filth should be allowed on the premises. Clothing should not be allowed to hang out unless boiled or disinfected before doing so.

To control an epidemic of scarlet fever it is absolutely necessary to have the co-operation of the people as a protection for themselves. The Health Department should receive the ablest support from the medical profession and all cases should be reported at once and a physician should see that a rigid quarantine is kept. On the other hand, the physician should receive the support of the health department and should feel free to call on the health officer to verify his diagnosis in case there is a doubt in the minds of the friends. It is a common occurrence for the family to discharge the attending physician when the diagnosis of the case involves a quarantine procedure.

* * *

RULES FOR TAKING BACTERIOLOGICAL SAMPLES.

Cultures for suspected diphtheria cases should be properly inoculated by carefully rubbing the swab over the blood serum several times taking care not to break up the culture medium.

Swabs should never be forwarded for examination, because they generally arrive dried out, and give doubtful results.

To get correct results, correct methods should be employed.

Sputum should be forwarded preferably in wide mouth glass bottles. Tin boxes are not practical, because in opening the fingers might be injured and infection caused from the material.

Blood for Widal Reaction is preferably forwarded upon a glass slide, aluminum foil or good sized paper. Bibulous paper is unfit for taking blood samples. One or two good sized drops are sufficient. They should be left on the glass, paper or aluminum foil until dry, put in an envelope and forwarded for examination.

No Gonorrhoeal material will be examined by the bacteriologist.

Very respectfully,
EMIL STARZ.

BACTERIOLOGICAL EXAMINATIONS MADE DURING THE MONTH OF JANUARY, 1914, BY EMIL STARZ, BACTERIOLOGIST.

January 1, 1914:

Dr. McCabe, Helena, Montana. Blood for Widal Reaction: Negative.

January 3, 1914.

Dr. B. A. Place, Great Falls, Montana. Blood for Widal Reaction: Negative.

January 5, 1914:

Dr. Dent, East Helena, Montana. Sputum for Tuberc. Bac.: Negative.

Dr. J. G. Thompson, Helena, Montana. Culture for Bac. Diphtheria: Negative.

January 7, 1914:

Dr. B. A. Place, Great Falls, Montana. Blood for Widal Reaction: Positive.

Dr. W. P. Smith, Columbus, Montana. Blood for Widal Reaction: Positive.

January 8, 1914:

Dr. Dent, East Helena, Montana. Sputum for Bac. Tub.: Negative.

Dr. McCabe, Helena, Montana. Blood for Widal Reaction: Negative.

January 9, 1914:

Dr. McCabe, Helena, Montana. Blood for Widal Reaction. Positive.

Dr. R. Horsky, Helena, Montana. Blood for Widal Reaction: Negative.

Dr. Kearney, Great Falls, Montana. Blood for Widal Reaction: Negative.

January 12, 1914:

Dr. Mott Arnold, Billings, Montana. Culture for B. Diphtheria: Streptococci.

January 13, 1914:

Dr. I. Leighton, Boulder, Montana. Blood for Widal Reaction: Positive.

Dr. Th. Pleasants, Lewistown, Montana. Blood for Widal Reaction: Positive.

Dr. C. W. Smith, Townsend, Montana. Smear for Diphtheriae: Bac. Diphtheria.

January 14, 1914:

Dr. L. L. Mayland, Great Falls, Montana. Sputum for Bac. Tuberc.: Negative.

Dr. Cockrell, Hinsdale, Montana. Blood for Widal Reaction: Positive.

G. Nichols, Lewistown, Montana. Sputum for Bac. Tuberc.: Negative.

Dr. Dean, Helena, Montana. Sputum for Bac. Tuberc.: Negative.

January 14, 1914:

Dr. S. Cooney, Helena, Montana. Sputum for Pneumococci. Found: Pneumococci and Streptococci.

January 17, 1914:

Dr. Larsen, Great Falls, Montana. Culture for Bac. Diphtheriae: Streptococci.

January 18, 1914:

Dr. J. Piedalue, Bozeman, Montana. Sputum for Bac. Tub.: Negative.

Dr. R. C. Purdy, Columbia Falls, Montana Sputum for Bac. Tub.: Negative.

Dr. W. P. Smith, Columbus, Montana Blood for Widal Reaction: Positive.

January 19, 1914:

Dr. M. Dean, Helena, Montana. Culture for Bac. Diphtherae: Negative.

January 20, 1914:

Dr. W. P. Smith, Columbus, Montana. Blood for Widal Reaction: Positive.

January 21, 1914:

Dr. Geo. Barbour, Helena, Montana. Culture for Bac. Diphtheriae: Streptococci.

January 22, 1914:

Dr. Balsam, Billings, Montana. Blood for Widal Reaction: Negative.

January 23, 1914:

Dr. Mott Arnold, Billings, Montana. Culture for Bac. Diphtheriae: Positive.

Dr. Patterson, Bozeman, Montana. Sputum for Bac. Tub.: Positive.

Dr. G. H. Barbour, Helena, Montana. Culture for Bac. Diphtheriae: Streptococci.

January 24, 1914:

Dr. Johnston, Helena, Montana. Blood for Widal Reaction: Positive.

Dr. Mott Arnold, Billings, Montana. Cerebrospinal Fluid for Meningococci. Found: Diplococcus Meningitidis Intracellaris.

January 25, 1914:

Dr. Fligman, Helena, Montana. Culture for Bac. Diphtheriae. Found: Staphylococci.

Dr. W. P Smith, Columbus, Montana Blood for Widal Reaction: Negative.

January 26, 1914:

Dr. W. P. Smith, Columbus, Montana. Blood for Widal Reaction: Negative.

Dr. Porter, Fort Benton, Montana. Blood for Widal Reaction: Negative

Dr. Consler, Glendive, Montana. Sputum for Bac. Tub.: Negative.

January 27, 1914:

Dr. J. G. Thompson, Helena, Montana. Blood for Widal Reaction: Negative.

Dr. J. Treacy, Helena, Montana Blood for Widal Reaction: Negative

Dr. F. E. McCann, Bozeman, Montana. Sputum for Tub. Bac.: Negative.

Dr S L Dietrich, Drummond, Montana Sputum for Bac. Tub.: Negative.

January 28, 1914:

Dr. Arthur Movius, Billings, Montana. Culture for Bac. Diphtheriae: Negative.

Dr. H. H. Judd, Bozeman, Montana. Culture for Diphtheriae: Positive.

Dr. Mott Arnold, Billings, Montana. Culture for Bac. Diphtheriae: Negative.

Dr. Ph. Cole, Helena, Montana. Culture for Bac. Diphtheriae: Negative.

January 29, 1914:

Dr. C. Jump, Bozeman, Montana. Blood for Widal Reaction: Positive.

Dr. Blair, Bozeman, Montana. Culture for Bac. Diphtheriae: Negative.

January 30, 1914:

Dr. Arthur Movius, Billings, Montana. Culture for Bac. Diphtheriae: Negative.

Dr. R. Horsky, Helena, Montana. Urinary sediment for Bac. Tuberc.: Negative.

Dr. Mayland, Great Falls, Montana Sputum for Bac. Tub.: Negative.

January 31, 1914:

Dr. Murphy, Fort Benton, Montana. Swab for Bac. Diphtheriae: Positive.

Dr. Johnston, Helena, Montana. Blood for Widal Reaction: Negative.

Dr. M. Dean, Helena, Montana. Blood for Widal Reaction: Negative.

* * *

Father was walking to Sunday-school with little Johnny and endeavoring to improve the time by teaching Johnny his Golden Text, the words of which were: "Whatsoever a man soweth that shall he also reap."

Johnny repeated it after his father several times and seemed to have mastered the correct wording. As they drew near the Sunday-school the father gave Johnny his last rehearsal. "Now, son," he said, "let's have the Golden Text once more without any help from me."

This is what he got from Johnny: "Whatsoever a man sews always rips."—Harper's Bazar.

* * *

LIFE'S MIRROR.

There are loyal hearts, there are spirits brave,
  There are souls that are pure and true;
Then give to the world the best you have,
  And the best will come back to you.

Give love, and love to your life will flow,
  A strength in your utmost need;
Have faith, and a score of hearts will show
  Their faith in your word and deed.

For life is the mirror of king and slave;
  'Tis just what we are and do;
Then give to the world the best you have,
  And the best will come back to you.

—Madeline Bridges.

Let the wear and tear come on the soles of your shoes rather than on the seat of your trousers.—Selected.

* * *

REFERRED TO PROOFROOM.

Mistress (who has been giving a lesson on punctuation, with special attention to the use of the hyphen)—"Now, Jessie tell me why we put a hyphen in 'bird-cage.' "

Jessie—"So's the bird can sit on it, teacher."—University Corespondent.

* * *

RAISING THE RATE.

Little Edward had got into the habit of saying "darn," and his mother very seriously disapproved.

"Edward," she said, "I am going to give you ten cents if you will promise me not to say 'darn' any more."

"All right, mother," said the boy, as he took the money, "I promise."

Putting the money into his pocket, he said:

"Mother, I know a word that's worth fifty cents."—Harper's.

* * *

Two little cousins, Jennie and Katie were disputing about who was the older of the two, when Jennie settled the argument by exclaiming, "Why Katie, I know I am older than you, 'cause I 'member 'stinctly one morning going over to your house and saying, "hello, aunt Sarah, where's Katie?" and aunt Sarah answered, "Why, Katie isn't borned yet."

* * *

COMMUNICABLE DISEASES REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF JANUARY, 1914.

Smallpox—Beaverhead, 2; Broadwater, 2; Cascade (Excl. of Great Falls), 2; Great Falls, 5; Chouteau, 5; Custer, 3; Dawson, 2; Anaconda, 1; Fallon, 2; Fergus, 38; Flathead, (Excl. of Kalispell), 1; Gallatin (Excl. of Bozeman), 2; Hill, 2; Jefferson, 3; Lewis and Clark (Excl. of Helena), 21; Helena, 3; Meagher, 5; Missoula City, 5; Powell, 1; Ravalli, 1; Sanders, 1; Silver Bow, 10; Butte, 54; Yellowstone (Excl. of Billings), 2; Billings, 8; Total, 181. Total last month, 78.

Diphtheria—Broadwater, 1; Cascade (Excl. of Great Falls), 1 Chouteau, 3; Custer, 1; Bozeman, 1; Hill, 1; Missoula County, 1; Rosebud, 1; Butte, 1; Valley, 6; Yellowstone (Excl. of Billings), 2; Billings, 3. Total, 22. Total last month, 13.

Scarlet Fever—Broadwater, 1; Carbon, 3; Cascade (Excl. of Great Falls), 9; Great Falls, 14; Chouteau, 3; Dawson, 2; Fallon, 1; Flathead (Excl. of Kalispell), 6; Bozeman, 1; Helena, 2; Powell, 5, Rosebud, 1; Stillwater, 1; Silver Bow (Excl. of Butte), 2; Butte, 5; Teton, 5; Valley, 3; Yellowstone (Excl. of Billings), 5; Billings, 9; Total, 78. Total last month, 76.

Typhoid Fever—Blaine, 6; Carbon, 1; Cascade (Excl. of Great Falls), 4; Great Falls, 1; Custer, 1; Bozeman, 1; Jefferson, 1; Helena, 6; Missoula City, 1; Stillwater, 5; Billings, 1; Total, 27. Total last month, 37.

Measles—Big Horn, 33; Carbon, 382; Cascade (Excl. of Great Falls), 2; Great Falls, 33; Custer, 24; Fergus, 5; Bozeman, 5; Hill, 18; Lewis and Clark, 1; Helena, 41; Madison, 22; Missoula City, 1; Musselshell, 11; Powell, 1; Stillwater, 87; Sweet Grass, 12; Yellowstone (Excl. of Billings), 143; Billings, 333. Total, 1142. Total last month, 304.

Whooping Cough—Butte, 1. Total, 1. Total last month, 1.

Tuberculosis—Dawson, 1; Sanatorium, 9; Missoula City, 1; Butte, 1. Total, 12. Total last month, 6.

C. S. Meningitis—Dawson, 1; Butte, 1. Total, 2. Total last month, 0.

DEATHS (EXCLUSIVE OF STILLBIRTHS*) REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF JANUARY, 1914, ARRANGED ACCORDING TO COUNTIES AND PRINCIPAL CITIES.

	Spotted Fever	Small Pox	Tuberculosis	Diphtheria	Scarlet Fever	Measles	Typhoid Fever	Meningitis	Whooping Cough	Pneumonia	Nephritis	Organic Heart Disease	Malignant Tumors	Acute Intestinal Diseases	Violence	Suicide	Alcholism	All Other Causes	
Beaverhead			1							1									2
Broadwater																		2	2
Carbon							1			2		1						3	7
Cascade (Excl. of)			1	2	3					1		1			1				9
Great Falls			1		8	1	1	2		6	3	2	1		2			16	43
Chouteau										1					1				2
Custer										1			1		2		1	6	11
Dawson								1		2	2	3	1			1		3	13
Deer Lodge (Excl. of)			4							1		1			1			3	10
Anaconda			1					1		5		1				1		5	14
Fergus		1	1				2			1	2	1			1			2	11
Flathead (Excl. of)			1							1					2			2	6
Kalispell			1							2								1	4
Gallatin (Excl. of)															1			1	2
Bozeman			1								1		1			1		1	5
Granite																		2	2
Jefferson							1					1			1			2	5
Lewis and Clark (Excl. of)											1	2					1	2	6
Helena										4	2	2	1		2			3	14
Lincoln											1								1
Madison																		4	4
Meagher										3		1						5	9
Missoula (Excl. of)															1			1	2
Missoula City			1							1	2	1	1		1	1	1	5	14
Musselshell											2	1							3
Park (Excl. of)																1			1
Livingston			1									1						2	4
Powell										1	2	1						1	5
Ravalli			2							1	1	2	2			1		5	14
Rosebud				1						1	1				1				4
Sanders												1			2				3
Silver Bow (Excl. of)			4		1					1		2	1	1	3		1	2	16
Butte			8	1				2		14	2	11	1	1	7		3	40	90
Sweet Grass											1								1
Teton								1		1				1	1		1	2	7
Valley												4							4
Yellowstone (Excl. of)										3	1	1			2			4	11
Billings				1		3		1	1	1		1	2					4	14
Blaine																			
Big Horn																			
Hill			1												2			6	9
Sheridan												2						1	3
Stillwater										1									1
Totals	..	1	29	5	12	4	5	8	1	56	24	44	12	3	34	6	8	136	388

Stillbirths—33.
Estimated Population, 420,000.
Monthly Death Rate per 1,000 Population, .923.
Annual Death Rate per 1,000 Population, 11.07.

BIRTHS (EXCL. OF STILLBIRTHS) REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF JANUARY, 1914, AND COMPARATIVE BIRTH AND DEATH RECORD IN THE STATE.

	Males	Females	Totals	Deaths	Excess of Births	Excess of Deaths
Beaverhead	7	6	13	2	11	
Broadwater		1	1	2		1
Carbon	3	4	7	7		
Cascade (Excl. of)	10	9	19	9	10	
Great Falls	20	32	52	43	9	
Chouteau	4	2	6	2	4	
Custer	26	27	53	11	42	
Dawson	5	10	15	13	2	
Deer Lodge (Excl. of)	1	2	3	10		7
Anaconda	12	7	19	14	5	
Fergus	13	9	22	11	11	
Flathead (Excl. of)	6	12	18	6	12	
Kalispell	6	7	13	4	9	
Gallatin (Excl. of)	8	10	18	2	16	
Bozeman	4	9	13	5	8	
Granite	1	1	2	2		
Jefferson	3	3	6	5	1	
Lewis and Clark (Excl. of)	3	5	8	6	2	
Helena	11	13	24	14	10	
Lincoln	1	2	3	1	2	
Madison	8	7	15	4	11	
Meagher	5	9	14	9	5	
Missoula (Excl of)	9	7	16	2	14	
Missoula City	9	7	16	14	2	
Musselshell	6	2	8	3	5	
Park (Excl. of)		2	2	1	1	
Livingston	9	8	17	4	13	
Powell	2	6	8	5	3	
Ravalli	8	5	13	14		1
Rosebud	2	1	3	4		1
Sanders	3	7	10	3	7	
Silver Bow (Excl. of)	17	14	31	16	15	
Butte	42	32	74	90		16
Sweet Grass	4	4	8	1	7	
Teton	8	13	21	7	14	
Valley	7	6	13	4	9	
Yellowstone (Excl. of)	10	10	20	11	9	
Billings	14	14	28	14	14	
Blaine		4	4		4	
Big Horn	1		1		1	
Fallon						
Hill	13	10	23	9	14	
Sheridan	16	3	19	3	16	
Stillwater	2	6	8	1	7	
	340	361	701	388	339	26

DIVISION OF FOODS AND DRUGS.

Dr. W. F. Cogswell, Secretary State Board of Health, Food and Drug Commissioner.

F. J. O'Donnell, Inspector.

LABORATORY STAFF.

W. M. Cobleigh, Chemist.
D. L. Weatherhead, Analyst.
D. B. Swingle, Bacteriologist.
Carl Gottschalck, Assistant Analyst.
Nina Armstrong, Clerk and Stenographer.

LABORATORY REPORT.

Samples Reported During the Month of January.

Classification.	No. Legal.	No. Illegal.	Total.
Butter (Dairy Commission)	4	27	31
Process Butter (Dairy Commission)	..	2	2
Oleomargarine (Dairy Commission)	..	1	1
Milk	3	2	5
Cream	..	1	1
Soft Drinks	26	..	26
Miscellaneous	..	..	6
Water	..	..	26
Total	33	33	98

Sixty-four samples were reported to the Secretary of the State Board of Health during the month of January. Of this number twenty-six were samples of soft drinks, five were samples of milk, one was a sample of cream, twenty-six were samples of water and six were of miscellaneous nature.

The twenty-six samples of soft drinks were tested for saccharin and were found to contain none.

Of the five samples of milk, three were legal and two illegal, both being below standard in fat.

The one sample of cream tested was below standard in fat.

Of the six miscellaneous samples two were preserving compounds, two were samples of bleaching powder and two were samples of stock solutions of bleaching powder.

The twenty-six water samples were collected as follows:

Armstead	1
Billings	3

Butte	1
Chester	1
Choteau	2
Clyde Park	1
Corvallis	1
Deer Lodge	1
Lavina	1
Livingston	8
Lewistown	1
Missoula	1
Poplar	4
Total	26

A more detailed report of the food samples follows:

MILK.
Standard or above.

Lab. No.	Date.	Obtained From.	Town.	Total Solids (%)	Solids Not Fat.	Fat.
2725	1-12-14	C. E. Snow	Billings	17.52	9.42	8.10
2717	1-5 -14	Clover Leaf Dairy	Billings	12.38	9.03	3.35
2764	1-31-14	Inter- State Co.	Harlowton	14.11	8.91	5.20

MILK.
Below Standard.

Lab. No.	Date.	Obtained From.	Town.	Remarks.
2721	1-12-14	Inter State Company	Harlowton	Low in fat.
2723	1-12-14	Inter State Company	Harlowton	Low in fat.

CREAM.
Below Standard.

Lab. No.	Date.		Town.	Remarks.
2722	1-12-14	Inter State Company	Harlowton	Low in fat.

SOFT DRINKS.

Lab. No.	Date.	Description.	Remarks.
2729	1-16-14	Iron Brew:—on label—Special Brew. Iron, non-alcoholic colored, Northwestern Bottling Works, Butte, Montana	Contains no saccharin.
2730	1-16-14	Champagne Cider:—On label, capacity 24 ozs. Champagne Cider artificial colored and flavored. Northwestern Bottling Works, Butte, Montana	Contains no saccharin.
2731	1-16-14	Ginger Ale:—On label, Hyball Ginger Ale colored, North-Western Bottling Wks., Butte, Capacity 24 ozs	Contains no saccharin.
2723	1-16-14	Strawberry Soda. On label: Northwestern Bottling Works, Butte, Montana	Contains no saccharin.
2733	1-16-14	Cream Soda, on label: Northwestern Bottling Works, Butte	Contains no saccharin.
2734	1-16-14	Lemon Soda. On label: Northwestern Bottling Works, Butte	Contains no saccharin.
2735	1-16-14	Sarsaparilla Soda. On label: Northwestern Bottling Works, Butte, Montana	Contains no saccharin.
2736	1-16-14	Ginger Ale. On label: Keenan Manuf. Co., Butte, Montana	Contains no saccharin.
2737	1-16-14	Lemon Soda. On label: Keenan Manuf. Co., Bute, Montana	Contains no saccharin.
2738	1-16-14	Root Beer. On label: Keenan Manuf. Co., Butte, Montana	Contains no saccharin.
2739	1-16-14	Sarsaparilla. On label: Keenan Manuf. Co., Butte, Montana	Contains no saccharin.
2740	1-16-14	Cream Soda. On label: Keenan Manuf. Co., Butte Montana	Contains no saccharin.
2741	1-16-14	Strawberry Soda. On label: Keenan Manuf. Co., Butte	Contains no saccharin.
2742	1-16-14	Cream Soda. On label: Holland Rink Bottling Works, Butte	Contains no saccharin.
2743	1-16-14	Strawberry. On label: Holland Rink Bottling Works, Butte	Contains no saccharin.
2744	1-16-14	Ginger Ale. On label: Holland Rink Bottling Works, Highest Standard of Quality. Aromatic Ginger Ale. The Queen Finest	Contains no saccharin.
2745	1-16-14	Champagne Cider. On label: Champagne Cider artificially colored and flavored, bottled by the Holland Rink Bottling Company, Butte, Montana	Contains no saccharin.
2746	1-16-14	Iron Beer. On label: Iron Beer colored with harmless sugar color non-alcoholic. Mfg. by the Lehman-Rosenfeld Co., Cinn., O., bottled by the Holland Rink Bottling Works, Butte	Contains no saccharin.
2747	1-16-14	Root Beer. On label: Root Beer, Hollond Rink Bottling Works, Butte, Montana	Contains no saccharin.

SOFT DBINKS—Cont.

Lab. No.	Date.	Description.	Remarks.
2748	1-16-14	Lemon Soda. On label: Holland Rink Bottling Works, Butte..	Contains no saccharin.
2749	1-19-14	Sarsparilla & Iron. On label: Rocky Mountain Bottling Works, Butte, Montana.......	Contains no saccharin.
2750	1-19-14	Cream Soda. On label: Rocky Mountain Bottling Works, Butte	Contains no saccharin.
2751	1-19-14	Strawberry Soda. On label: Rocky Mountain Bottling Works, Butte, Montana.........	Contains no saccharin.
2752	1-19-14	Lemon Soda. On label: Rocky Mountain Bottling Works, Butte	Contains no saccharin.
2753	1-19-14	Root Beer. On label: Rocky Mountain Bottling Works, Butte, Montana	Contains no saccharin.
2754	1-19-14	Ginger Ale. On label: Rocky Mountain Bottling Works, Butte, Montana	Contains no saccharin.

MISCELLANEOUS.

Lab. No.	Date.	Description.	Remarks.
2376	1-13-14	Freeze-em Pickle. On label: Freeze-em Pickle a prepared pickle for curing hams, shoulders, etc. B. Heller & Co., Chicago, Ill.	Passed.
2440	1-13-14	F. L. P. Preservative for meats. On label: F. L. P., a standardized combination of strickly pure double refined saltpetre and refined salt. The Preservaline Manufacturing Co., Brooklyn, N. Y.........	Passed.
2760	1-22-14	Calcium Hypochlorite, sent in by the Billings Water Co....	Available Chlorine—33.72%.
2761	1-22-14	Bleach solution, sent in by the Billings Water Co...........	Available Chlorine— .289%.
2766	1-27-14	Calcium Hypochlorite sent in by the Billings Water Co....	Available Chlorine—33.93%.
2768	1-27-14	Bleach solution sent in by the Billings Water Co............	Sample container broken in shipment.

WEIGHT OF THE WRAPPERS IN PACKAGE BUTTER.

When butter is sold in packages the weight stated refers to the net weight and not to the gross weight unless otherwise stated. It is sometimes of advantage, therefore, to have an idea of what the wrappers on such a package of butter might be expected to weigh so that an approximate estimate of the net weight could be obtained from the gross weight of the package.

A record was kept of the tare of forty-six samples of butter which came into the laboratory for analysis, the samples being classified according to the manner of their wrapping, as follows:

I.

Outside paper cover, pasteboard carton and two inside wrappers.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 30	1 3-4	D. 55	1 5-16
D. 36	1 13-16	D. 61	1 1-2
D. 37	1 7-8	D. 63	1 11-16
D. 39	1 3-8	D. 64	1 3-4
D. 44	1 13-16	D. 69	1 3-8
D. 48	1 7-8	2775	1 7-16
D. 50	1 3-4	2777	1 3-4
D. 52	1 13-16	2778	1 5-8

Number of samples, 16.
Maximum Tare, 1 7-8.
Minimum Tare, 1 5-16.
Average, 1 21-32.

II.

Outside paper cover, pasteboard carton, and one in side wrapper.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 25	1 9-16	D. 45	1 1-4
D. 29	1 7-16	D. 51	1 1-8
D. 43	1 1-8	D. 56	1 1-16

Number of samples, 6.
Maximum, 1 9-16.
Minimum, 1 1-16.
Average, 1 1-4.

III.

Pasteboard carton, one inside wrapper.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 23	1 5-16	D. 28	7-8
D. 58	7-8	D. 67	15-16
2776	1 5-16		

Number of samples, 5.
Maximum, 1 5-16.
Minimum, 7-8.
Average, 1 1-16.

IV.

Pasteboard carton and two inside wrappers.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 24	1 1-8	D. 41	1 1-8
D. 49	1	D. 53	1 5-8
D. 54	1 5-8	D. 57	1
D. 66	1 5-16		

Number of samples, 7.
Maximum, 1 5-8.
Minimum, 1.
Average, 1 1-4.

V.

One paper wrapper.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 34	1-4	D. 62	1-8
D. 68	1-4	D. 70	3-16

Number of Samples, 4.
Maximum, 1-4.
Minimum, 1-8.
Average, 3-16.

VI.

Package divided into four parts. Outside paper cover, pasteboard carton, one large inside wrapper and four small inside wrappers one on each one-fourth.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 33	1 7-8	D. 40	1 3-4
D. 46	2	D. 59	1 1-2

Number of samples, 4.
Maximum, 2.
Minimum, 1 1-2.
Average, 1 25-32.

VII.

Package divided in four parts. Outside paper cover, pasteboard carton and one small wrapper on each one-fourth.

Lab. No.	Tare in ozs.
D. 42	1 5-16

VIII.

Package of oblong shape. Pasteboard carton and one inside wrapper.

Lab. No.	Tare in ozs.
D. 26	1 5-16

IX.

Package of oblong shape and divided into four parts. Outside paper cover, pasteboard carton, one large inside wrapper and four small inside wrappers, one on each one-fourth.

Lab. No.	Tare in ozs.	Lab. No.	Tare in ozs.
D. 35	1 15-16	D. 60	1 7-8

It is seen that there is quite a variation in tare in individual packages in the same class. The chief cause of this variation is probably the variation in the dampness of the wrappers, especially the one next to the butter itself. This is especially true when the first paper put around the butter is wet and much water is left on it when the other coverings are put on. This water will be gradually lost and will cause a variation in the tare depending on the freshness of the butter. No definite figure can then be deduced from these data to represent the tare on a class of packages. An idea of the approximate tare can be derived, however, that may be of use in telling when the net weight is either clearly above or clearly below the required weight.

* * *

THE PURITY OF SURFACE WATERS IN MONTANA.

The most important waterways in Montana from the standpoint of their use as public water supplies for domestic purposes are the Yellowstone and Missouri rivers. A number of the important cities of the state take their water supplies from these two rivers. Both rivers drain large inhabited areas and consequently receive more or less contamination from the water sheds. Unpurified city sewage flows to each river at points varying in their distances above the several city intakes. Consequently the purity of the city water supplies taken from these rivers have often been questioned by the public.

The information collected by making sanitary inspections of these rivers and the laboratory data secured and studied in the light of certain general principles of sanitary science, point to some general conclusions about which the public concerned should be informed.

The first point to establish is that it is not to be expected that these water ways are now in "their original and natural condition of purity." The committee on standards of purity for rivers and water ways of the National Association for preventing the Pollution of Rivers and Waterways, make the following statement in their report. "This committee finds that on account of the increasing population of the country it is and always will be physically impossible to maintain waterways, in their original and natural condition of purity. A reasonable degree of cleanliness should nevertheless be demanded."

This committee further states that "Streams from which water supplies are taken without purification should not receive any fecal matter, sewage, sewage effluent or wastes that will render the water a menace to health or otherwise impair its natural quality." Applying these statements to the Yellowstone and Missouri rivers it is evident that these waters are not now in their natural state of purity. Considering the contamination received from the water sheds and from city sewage the question arises, is it reasonable to suppose that these waters are contaminated to the extent that they are a menace to health? In answering this question it should be understood that there is no universal standard of water purity that can be applied to all cases. Each problem like this is more or less a local one and the matter of a standard of purity must be established for each case with the data available.

However, there are certain general principles of sanitary science that should be taken into account when passing judgment on the purity of any water. The most important of these principles are clearly stated by *Hill & Whitcomb as follows:

"Nearly everyone in the medical world today is more or less familiar with the theorem formulated by Hazen and the so-called Mills-Reincke Phenomenon. Mr. Hiram F. Mills member of the Massachusetts State Board of Health, and Chief Engineer of the Locks and Canals on Merrimack river, observed, that shortly after the introduction of a filtered and purified water supply in Lawrence, there was a marked decrease, not merely in the death rate from typhoid fever, but also from other diseases. At the same time Dr. J. J. Reincke, Health Officer of Hamberg, Germany, observed a similar effect on the death rate of his city following the installation of a purer water supply. From these observations, together with observations made by him in the cities of Troy and Albany, Mr. Allen W. Hazen, evolved a theorem which he states as follows: 'Where one death from typhoid fever has been avoided from the use of better water, a certain number of deaths, probably two or three, from other causes have been avoided.' "

Professor W. T. Sedgewick and Mr. J. S. MacNutt have made further studies of the Mills-*Reincke phenomenon and in addition to the cities above cited, examined the death rates of Lowell and Binghamton and found that following the introduction of a purer water supply in these cities, there was a decrease in the number of deaths due, not only to typhoid fever, but to other causes. They found that the decrease in death rate was particularly noticeable in such diseases as diarrhoea, cholera infantum other gastro intestinal diseases, pneumonia, pulmonary tuberculosis and bronchitis. Furthermore, they noted an apparent improvement in the general health of the community, not traceable to the reduction in these diseases.

Of the diseases just mentioned, it will probably be admitted that the causative factor in the production of diarrhoea, cholera infantum, pneumonia and pulmonary tuberculosis may be bacterial. We will venture to state that most gastro intestinal diseases have their origin through the agency of bacteria. It will also be admitted by most that typhoid, cholera, diarrhoea, cholera infantum, dysentery and other acute gastro intestinal disease may be water borne. There are some who claim that pulmonary tuberculosis may be conveyed through the medium of water. So far as this paper is concerned, however, the most interesting fact here presented is that all of the acute gastro intestinal diseases have, at one time or another, been attributed to water. If this be so, why may not chronic intestinal tract infections be water borne?"

The above considerations should be applied to the question of determining the possible menace to health of the city waters

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* American Journal of Public Health, Sept. 1913.

taken from the Yellowstone and Missouri rivers. It should be noted in particular that typhoid fever, as many people think, is not the only water borne disease, and in fact this disease, is according to Hazen's principle not more than one-third of the problem in determining the purity of a given water.

A number of analyses of samples of water taken from the Yellowstone river and from the Missouri river, have been made from time to time. These analyses are tabulated in this bulletin and the following conclusions have been drawn from the laboratory data, and the information gained from sanitary inspections interpreted in the light of the principles of sanitary science.

CONCLUSIONS.

(First.) It is not possible to express exactly how great a menace to health the city water supplies taken from the Yellowstone and Missouri rivers are. The reasons for this statement are as follows: There is no universal standard of water purity. The diseases that may be legitimately regarded as water borne are not known with sufficient certainty. The health statistics of the cities supplied with these waters have not been studied with the idea of determining the possible effects of the water supplies on health.

(Second.) That some supicion should rest on the purity of these water supplies is apparent when it is recalled that at times both rivers receive contamination from the water sheds and some city sewage and sewage effluent at all times. Further, both the bacteriological tests and the chemical analyses indicate that the waters at the several intakes are contaminated at times. It should further be noted that it is more difficult to obtain evidences of contamination in the water samples drawn from city taps, because of the purification that may take place in intake wells, settling basins and in the pipes before delivery to the consumer.

(Third.) On the assumption that a water supply to be recommended for public consumption, should be as safe as possible under our present knowledge, it seems very reasonable to state that all water supplies taken from rivers receiving more or less contamination from the water sheds and also city sewage, should be purified by some of the well known methods. The purifying process should be installed as soon as there is any well founded suspicion that the contamination has reached an amount that is a menace to health.

In this connection it should be stated that hypochlorite disinfection plants are in operation at the Great Falls City Water Works, at the Boston and Montana Water Plant supplying Little Chicago, and the Montana Water Company at Billings. An emergency plant has been installed at Livingston, which will be put in operation whenever analyses of the water indicate that it is necessary or desirable. In subsequent bulletins details of the operation of these plants together with the results of efficiency tests will be published.

* * *

YELLOWSTONE RIVER AND LIVINGSTON CITY WATER.
PARTS PER MILLION.

Labratory Number.	Description.	Date.	Solids	Nitrogen As		Nitrogen As		Oxygen Consumed.	Chlorine.	Bacteriological Examination.
				Free Ammonia.	Albumenoid Ammonia	Nitrites.	Nitrates.			
31	At intake	8-28-09	136	0.03	0.11	None	None	....	7.1	None made.
33	City tap	8-28-09	159	0.03	0.06	None	0.11	....	7.1	None made.
59	City tap	....	153	None	0.04	Trace	0.11	....	8.5	None made.
73	Opposite intake	10-22-09	149	0.05	0.10	0.0045	0.067	....	9.7	None made.
74	City tap	10-22-09	161	0.04	0.03	Trace	0.013	....	10.4	None made.
82	Opposite intake	11-11-09	163	0.08	0.05	0.0045	0.09	....	11.0	None made.
83	City tap	11-11-09	174	0.08	0.05	0.0045	0.113	....	11.0	None made.
102	City tap	1-22-10	392	0.03	0.03	None	0.18	....	0.5	None made.
117	City tap	2- 4-10	...	0.05	0.02	None	0.20	0.45	11.3	None made.
124	Intake	2-14-10	187	0.14	0.04	0.0018	0.13	1.4	11.0	No. B. Coli. in 6 Cc.
126	City tap	2-14-10	188	0.075	0.025	0.0018	0.20	....	11.0	No. B. Coli in 6 Cc.
163	Intake	3-16-10	154	0.05	0.09	0.003	0.18	0.9	12.0	No B. Coli in 3 Cc.
164	City tap	3-16-10	170	0.01	0.065	0.0006	0.27	0.7	11.0	No B. Coli in 3 Cc.
199	Intake	4-26-10	115	0.05	0.14	0.0048	0.067	....	4.5	None made.
200	City tap	4-26-10	156	0.04	0.06	None	0.23	....	7.0	None made.
316	Intake	7-13-10	...	0.045	0.01	0.002	0.045	1.4	6.6	None made.
362	Intake	7-22-10	130	0.02	0.119	0.003	0.068	2.15	6.5	20 B. Coli per Cc.
791	Pumps	6-12-12	180	0.016	0.098	None	0.14	3.45	11.2	None made.
1770	Pumps	4-14-13	254	0.07	0.36	Trace	0.10	3.87	10.7	No B. Coli in 3 Cc.
1772	Above intake	4-14-13	381	0.076	0.40	Trace	0.14	3.91	10.7	No B. Coli in 3 Cc.
1937	City tap	6- 3-13	...	None	0.123	0.0033	0.6	3.20	2.55	....
2064	Intake	6-28-13	220	0.036	0.15	0.002	Trace	0.8	2.04	3 B. Coli per Cc.
2065	Pumps	6-28-13	154	0.022	0.048	None	0.4	1.55	5.6	No B. Coli per Cc.
2124	Intake	7-15-13	199	0.032	0.125	0.002	Trace	0.75	7.13	10 prob. B. Coli per Cc.
2125	Pumps	7-15-13	144	0.02	0.114	None	0.2	1.4	6.1	1 prob. B. Coli per Cc.
2206	Pumps	7-29-13	118	0.046	0.133	None	0.2	1.25	5.09	No B. Coli per Cc.
2207	Intake	7-29-13	141	0.02	0.16	Trace	0.06	2.10	4.84	None made.
2293	Intake	8-16-13	119	0.076	0.177	Trace	Trace	3.45	6.11	None made.
2294	Pumps	8-16-13	104	0.032	0.10	None	None	1.3	6.11	None made.
2377	Pumps	8-28-13	114	0.013	0.026	None	None	2.5	4.1	None made.
2378	Pumps	8-28-13	120	0.024	0.047	None	None	0.9	6.11	None made.
2379	Intake	9- 2-13	126	0.114	0.053	None	None	1.25	7.64	None made.
2380	Pumps	9- 2-13	126	0.053	0.05	None	None	0.70	7.64	None made.
2420	Pumps	9- 8-13	122	0.018	0.03	None	0.1	1.25	4.07	None made.
2421	Intake	9- 8-13	122	0.026	0.089	None	0.05	1.25	7.13	None made.
2477	Intake	9-17-13	114	0.012	0.04	None	None	1.05	8.14	None made.
2478	Pumps	9-17-13	110	0.024	0.048	None	0.06	1.35	8.14	None made.
2507	Intake	9-23-13	126	0.032	0.111	None	None	1.40	7.13	None made.
2508	Pumps	9-23-13	130	0.042	0.07	None	0.06	1.90	7.13	None made.
2502	Intake	10- 1-13	...	Trace	0.064	None	None	1.25	7.1	1 prob. B. Coli in 3 Cc.
2503	Pumps	10- 1-13	...	None	0.048	None	0.08	1.15	7.1	....
2635	Pumps	10-27-13	160	0.012	0.076	None	0.04	1.40	9.16	No B. Coli in 3 Cc.
2636	Intake	10-27-13	160	0.012	0.064	0.001	0.08	1.10	9.16	No B. Coli in 3 Cc.
2637	City tap	10-27-13	...	0.012	0.072	Trace	0.04	1.25	9.16	No B. Coli in 3 Cc.
2638	City tap	10-28-13	...	0.012	0.072	Trace	0.04	1.00	9.16	No B. Coli in 3 Cc.
2667	Pumps	11-24 13	180	0.024	0.048	Trace	0.2	3.5	12.7	No.B. C. in 3 Cc. No g. f.
2668	Intake	11-24-13	184	0.024	0.048	0.0005	0.08	3.3	13.2	No. B. C. in 3 Cc. No g. f.
2672	Intake	12- 2-13	150	0.016	0.066	0.0005	0.05	0.45	8.14	No. B. C. in 3 Cc. No g. f.
2673	Pumps	12- 2-13	190	0.016	0.048	Trace	0.1	1.55	8.14	No B. C. in 3 Cc. No g. f.
2681	Intake	12- 9-13	160	0.046	0.088	0.0005	0.04	2.0	11.2	No B. C. in 3 Cc. No g. f.
2682	Pumps	12- 9-13	184	0.032	0.084	Trace	0.2	1.2	11.2	No B. C. in 3 Cc. No g. f.

YELLOWSTONE RIVER—LAUREL.
PARTS PER MILLION.

Laboratory Number	Date	Solids	Nitrogen As		Nitrogen As		Oxygen Consumed	Chlorine	Bacteriological Examination.
			Free Ammonia	Albumin Ammonia	Nitrites	Nitrates			
39	....	164	0.03	0.17	Trace	None	....	6.1	None made
80	12–10–09	322	0.16	0.09	0.0045	0.20	....	13.5	None made.
93	12–31–09	152	0.05	0.02	Trace	0.23	0.65	10.0	No B. Coli in 3 Cc.
94	12–30–09	424	0.06	0.06	0.0045	0.36	0.85	13.0	One doubtful B. Coli.
105	1–22–10	157	0.055	0.04	0.003	0.181	0.9	9.0	None made.
106	1–22–10	170	0.075	0.03	0.003	0.181	0.05	9.0	No B. Coli in 6 Cc.
107	1–22–10	377	0.07	0.045	0.006	0.41	0.9	12.0	No B. Coli in 4 Cc.
154	3–12–10	316	0.06	0.19	0.003	0.18	2.8	8.0	None made.
157	3–12–10	396	0.06	0.24	0.0036	0.226	3.45	8.5	None made.
170	3–25–10	225	0.025	0.075	0.0024	0.07	2.2	7.0	No B. Coli in 5 Cc.
171	3–26–10	204	0.030	0.095	0.0021	0.045	2.1	6.7	....
172	3–26–10	214	0.025	0.075	0.0027	0.09	2.0	6.7	....
173	3–26–10	201	0.01	0.055	0.0018	0.07	2.6	6.7	....
224	5–14–10	182	0.05	0.13	0.0036	Trace	3.05	1.5	None made.
226	5–14–10	176	0.03	0.17	0.003	Trace	2.9	2.5	None made.
229	5–16–10	148	0.025	0.10	0.0018	Trace	....	2.0	No B. Coli in 3 Cc.
230	5–16–10	178	0.05	0.115	0.0024	Trace	....	3.0	None made.
334	7–15–10	136	None	0.035	None	0.045	1.4	7.13	250 B. Coli per Cc.
357	3–12–10	396	0.06	0.24	0.0036	0.226	3.45	8.5	None made.
383	9–10–10	211	0.01	0.10	Trace	0.09	1.45	10.5	None made.
386	9–17–10	230	0.04	0.08	0.0012	0.05	1.15	9.0	No B. Coli in 5 Cc.
390	9–20–10	224	0.055	0.056	0.0006	0.045	....	8.5	Many B. Coli per Cc.
457	12–28–10	222	0.014	0.022	0.0024	0.136	0.95	11.3	No B. Coli in 3 Cc.
458	12–28–10	282	0.014	0.031	0.003	0.226	1.1	12.0	No B. Coli per 3 Cc.
562	6–13–11	150	0.031	0.147	0.0024	0.068	4.15	1.53	None made.

YELLOWSTONE RIVER AND BILLINGS CITY WATER.

Laboratory Number.	Description.	Date.	Solids	Nitrogen As		Nitrogen As		Oxygen Consumed.	Chlorine.	Bacteriological Examination.
				Free Ammonia	Albumin Ammonia	Nitrites	Nitrates			
	City tap	3– 4–09	268	0.070	0.080	None	0.181	....	9.27	None made.
42	City tap	8– –09	187	0.020	0.080	Trace	0.045	....	6.1	None made.
96	City tap	12–30–09	306	0.060	0.030	Trace	0.226	0.83	9.5	None made.
110	City tap	1–22–13	282	0.060	0.050	0.0024	0.248	0.5	8.5	No B. Coli in 4 Cc.
119	Intake	2– 9–10	317	0.045	0.055	0.0012	0.2938	1.0	10.0	8 B. Coli in 6 Cc.
120	Pumps	2– 9–10	304	0.055	0.040	0.0015	0.294	0.9	9.5	No B. Coli in 6 Cc.
121	City tap	2– 9–10	304	0.045	0.065	0.0015	0.316	0.65	9.5	No B. Coli in 6 Cc.
122	City tap	2– 9–10	312	0.050	0.030	0.0018	0.339	0.65	9.3	No B. Coli in 6 Cc.
140	Intake	3– 1–10	272	0.030	0.070	0.003	0.361	1.2	9.0	No B. Coli in 3 Cc.
141	Pumps	3– 1–10	265	0.050	0.050	0.003	0.361	0.9	9.5	No B. Coli in 3 Cc.
142	City tap	3– 1–10	264	0.025	0.050	0.0015	0.497	0.95	9.5	No. B. Coli in 3 Cc.
159	Intake	3– 4–10	302	0.060	0.190	0.0024	0.271	2.35	8.0	None made.
160	Pumps	3– 4–10	262	0.100	0.100	0.0024	0.271	1.9	7.5	None made.
161	City tap	3– 4–10	268	0.060	0.120	0.0018	0.271	1.9	7.5	None made.
206	Intake	5– 4–10	193	0.035	0.090	0.0018	Trace	2.3	3.1	No. B. Coli in 5 Cc.
207	Pumps	5– 4–10	180	0.045	0.085	0.003	Trace	2.65	2.0	No B. Coli in 5 Cc.
208	City tap	5– 4–10	170	0.040	0.090	0.0006	Trace	2.35	2.0	No B. Coli in 5 Cc.
336	Above intake	7–18–10	164	0.022	0.240	Trace	0.045	1.4	5.09	1450 B. Col per Cc.
337	Intake	7–18–10	148	0.037	0.173	Trace	0.019	1.4	5.09	50 B. Coli per Cc.
338	City tap	7–18–10	182	0.022	0.140	0.0003	0.007	1.4	5.09	None made.
381	City tap	9–11–10	274	0.080	0.120	0.0015	0.181	1.4	10.5	None made.
426	Intake	10–30–10	322	0.015	0.053	0.0009	0.271	0.9	9.0	No B. Coli per Cc.
427	City tap	10–30–10	326	0.015	0.037	0.0018	0.271	0.85	9.0	1 B. Coli per Cc.
436	Intake	12–14–10	333	0.013	0.079	0.0024	0.271	1.45	10.0	None made.
438	City tap	12–14–10	328	0.008	0.049	0.0021	0.294	1.1	10.0	None made.
451	City tap	12–28–10	...	0.015	0.035	0.0018	0.294	1.35	11.3	None made.
453	City tap	12–28–10	...	0.017	0.038	0.003	0.271	1.1	10.8	None made.
598	Intake	12– 7–11	318	0.032	0.085	0.0018	0.249	0.9	8.70	No B. Coli per Cc.
599	City tap	12– 7–11	318	0.012	0.073	0.0009	0.249	0.95	9.2	No B. Coli per Cc.
601	Intake	12–15–11	310	0.067	0.160	0.0018	0.23	0.8	10.18	48 B. Coli per Cc.
602	City tap	12–15–11	313	0.066	0.130	0.0047	0.23	0.65	9.16	No B. Coli in 3 Cc.
1752	Intake	3–26–13	379	0.060	0.250	None	0.4	3.05	10.18	No B. Coli in 3 Cc.
1753	Pumps	3–26–13	353	0.060	0.140	None	0.4	1.13	10.7	No B. Coli in 3 Cc.
1754	City tap	3–26–13	338	0.088	0.112	None	0.35	0.91	10.43	No B. Coli in 3 Cc.
1842	Intake	4–30–13	...	0.020	0.094	None	Trace	1.83	5.1	No B. Coli in 3 Cc.
1843	Pumps	4–30–13	...	0.008	0.084	Trace	Trace	2.00	5.1	No B. Coli in 3 Cc.
1844	City tap	4–30–13	...	0.021	0.089	None	Trace	1.87	5.3	No B. Coli in 3 Cc.
2018	Intake	6–25–13	...	0.024	0.160	Trace	Trace	3.00	1.02	None made.
2019	Pumps	6–25–13	...	0.024	0.140	None	None	1.80	1.0	None made.
2631	Intake	10–23–13	248	0.028	0.153	0.0005	0.05	1.0	6.60	No B. Coli in 3 Cc.
2632	Tap, west side	10–23–13	260	0.030	0.160	Trace	0.06	1.4	6.60	No.B. Coli in 3 Cc.
2633	Tap, down town	10–23–13	260	0.028	0.163	Trace	0.06	1.4	6.60	No B. Coli in 3 Cc.

MISSOURI RIVER AND GREAT FALLS CITY WATER.
PARTS PER MILLION.

Laboratory Date	Description.	Date	Solids	Nitrogen As		Nitrogen As		Oxygen Consumed	Chlorine	Bacteriological Examination
				Free Ammonia	Albumin Ammonia	Nitrites	Nitrates			
100	Intake	1-10-13	...	0.06	0.06	None	0.18	0.9	15.5	....
1763	Pumps	8- 4-13	...	0.02	0.10	0.01	0.1	1.65	11.7	A few probable B. Coli.
1766	City tap	4- 8-13	278	0.016	0.13	0.012	0.1	1.26	15.27	A few probable B. Coli.
1733	Pumps	4-14-13	212	0.03	0.13	0.001	0.2	2.00	4.6	No B. Coli in 3 Cc.
1744	City tap	4-14-13	191	00.05	0.26	0.009	0.28	3.6	8.7	No B. Coli in 3 Cc.
1848	City tap	5- 2-13	...	0.027	0.32	None	0.02	4.7	6.6	No.B. Coli in 3 Cc.
1849	Pumps	5- 2-13	...	0.012	0.40	None	0.02	4.7	6.6	No B. Coli in 3 Cc.
1863	City tap	5-15-13	...	0.016	0.20	None	None	2.6	3.6	No B. Coli in 3 Cc.
1869	City tap	5-22-13	370	0.02	0.146	None	Trace	4.25	5.09	No B. Coli in 3 Cc.
1872	Pumps	5-22-13	206	0.02	0.114	None	Trace	3.85	4.8	No B. Coli in 3 Cc.
2469	Pumps	9- 6-13	228	0.016	0.14	None	None	1.40	11.2	None made.
2505	Intake	10- 2-13	244	0.032	0.074	None	0.02	1.6	11.7	Many prob. B. Coli per Cc.